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are never so sedate that they do not seem to be bubbling over with fun and to be ready at a moment's notice to engage in any mischief that may occur to their scheming little heads.*

INDIAN NETSINKERS AND HAMMERSTONES.†

BY CHARLES RAU.

The two kinds of Indian stone implements which form the subject of this article are by no means remarkable for skilful workmanship, and therefore, probably, have thus far attracted little notice in this country. In archæology, however, every object that can serve to illustrate the former condition of a people is of significance, and it matters not whether that object is elaborately finished or has suffered but little alteration by the hand of man. I place netsinkers and hammerstones together, because the specimens in my possession, which form the basis of my description, were derived from the same locality, namely, both banks of the Susquehanna river near the small town of Muncy, in Lycoming County, Pennsylvania. I possess a great number of the above-named implements of all shapes and sizes, which were sent to me by Mr. J. M. M. Gernerd, a resident of Muncy. To this gentleman I am also indebted for the communication of the details which enable me to furnish the following account.

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*Since the main portion of this article was written, one of the pets has died. It is the female that is lost — the tamest and best natured, but least sprightly of the pair. It is to be feared that she was killed by kindness, as she had been fed on soft food much of the time, and so did not have to crack nuts for a living. A post mortem showed that the body was covered with thick layers of fat; and more than this, that he abdominal cavity was more than half filled with solid masses of fat; so as there was no other visible cause for her decease, the inference is that she died of *adiposity*. It is sad to say aught that may diminish any one's admiration for these really charming animals, but truth requires me to say that I have watched in vain for any signs of grief in the remaining squirrel. He sleeps as soundly and performs his various gymnastics as gleefully as ever. The only difference in his conduct I am able to detect is, that whereas formerly he instantly seized any and everything that was offered, he is now quite particular, entirely refusing many articles that used to be a part of his diet. It may be that grief affects his appetite; but it is to be feared that, having discovered that there is no one to snatch his food if he does not eat it, he takes time to choose that which is most agreeable. At any rate all the evidence goes to show that these really attractive creatures do not possess any deep affection even for each other.

†Translated by the Author from Vol. V of the "Archiv für Anthropologie."

Netsinkers and hammerstones are found in various localities of the United States; but I am not aware that they occur in any other place as frequently as in the neighborhood of Muncy. Netsinkers have been taken away from there by the hundred, and yet their number is not exhausted; hammerstones, however, although likewise numerous, occur there less frequently. The other productions of primitive art, which always indicate the former presence of the Indians, such as stone tomahawks, wedge-shaped stone implements, flint arrowheads, fragments of coarse pottery, etc., are also found in the environs of Muncy.

The netsinkers in question are flat pebbles of roundish or angular (generally indefinite) shape and of various sizes, which exhibit on two opposite points of the circumference an indentation or notch, more or less deep, and produced by blows. Besides the notches, which facilitated the attachment to the nets, these pebbles have not undergone the slightest change by human agency; and their manufacture, therefore, required but little labor and skill. My smallest specimen measures two inches in diameter and weighs only half an ounce; my largest one, a flat stone of irregular outline, is eight inches wide across the broadest part and weighs two pounds and fourteen ounces. I must mention, however, that the last-named specimen is unusually large and heavy, the average size

Fig. 30.

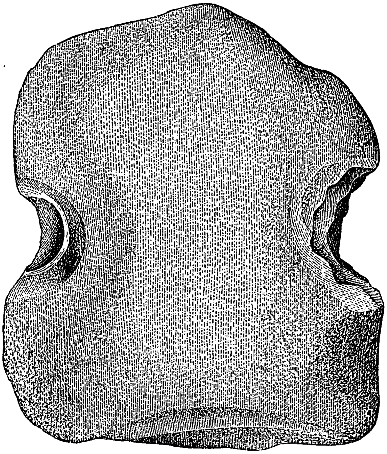
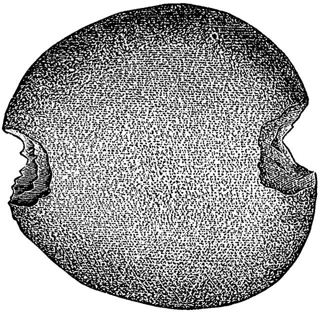


Fig. 31.

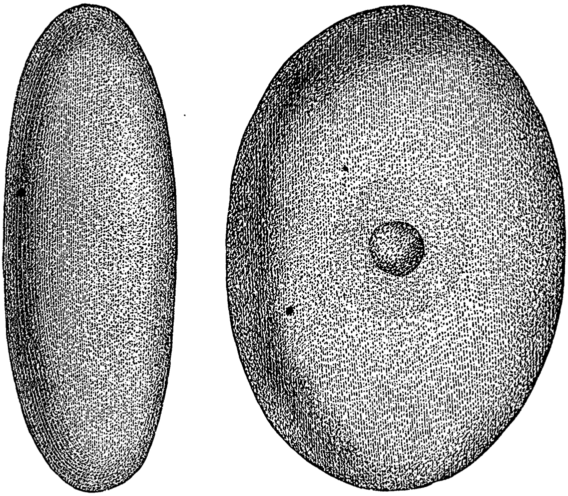


Netsinkers (one-half natural size).

of the sinkers being from three to five inches, with a corresponding weight of from six to ten ounces.

Figures 30 and 31 represent netsinkers of my collection in half-size, which weigh respectively eleven ounces and seven ounces and a quarter. The original of Fig. 30 is in the middle five-eighths of an inch in thickness, that of Fig. 31 is about seven-eighths of an inch thick. Sinkers with four notches also occur near Muncy, though not very frequently, and in these cases the notches are so placed that the stone was encompassed crosswise by the strings or thongs which connected it with the net. One of the specimens found at Muncy is even provided with seven indentations. The material of these netsinkers is almost exclusively a flat-breaking silico-argillaceous stone of gray or brownish color, sometimes containing diminutive particles of mica, and consequently bearing the distinct character of graywacke. The latter kind of rock belongs to the geological formation of Muncy, and occurs also in numerous pebbles in the neighboring creeks, which empty into the Susquehanna. The Indians, therefore, had little difficulty in obtaining the stones used as sinkers.

Fig. 32.



Hammerstone (one-half natural size).

No greater skill was required in the manufacture of the hammerstones. They are nearly always roundish or oval pebbles of a somewhat compressed or flattened form, presenting in their side-view the outline of a more or less elongated ellipse. Their only artificial alteration consists in two small pits or cavities, so placed as to form the centres of the opposite broad sides of the pebble. In these cavities the workman placed the thumb and middle finger of the right hand, while the forefinger pressed against the upper circumference of the stone. Figure 32 (two views) is a half-size drawing of one of these hammerstones, and may serve to represent their general character. The original of Figure 32, however, is one of the larger specimens, measuring a little more than five inches in longitudinal diameter, and weighing one pound and ten ounces. Most of the hammerstones are smaller and lighter, averaging about a pound in weight. My smallest specimen, almost circular and with a diameter of two inches and three-quarters, weighs only half a pound. Concerning the cavities on the opposite sides, I will state that the makers evidently chiselled them out, as it were, with a tool of hard stone, doubtless a pointed flint, for which reason they sometimes appear rough and irregular. In the more finished specimens, however, they exhibit regular cup-like concavities, obviously produced by grinding. In some instances the depressions are so shallow that they almost escape observation, while they reach in other cases from eight to nine millimetres into the stone, and thus afford the hand a firm hold. Yet quite a number of the hammerstones under notice exhibit, instead of the cup-shaped cavities, on the opposite broad sides, *roughly* ground faces, sometimes several inches in diameter, and answering well the purpose of allowing the hand a secure grasp of the stone. Many of the hammerstones bear the distinct traces of use, being battered and crumbled at the circumference; and a few of the specimens in my possession are even burst as far as the centre by the force of the blows dealt with them. The material of the hammerstones of Muncy is a tolerably hard stone consisting of rounded quartz grains, apparently a metamorphic quartz, or quartzite.

In Europe, it is well known, similar hammerstones occur, which have been called *Tilhuggerstene* by Danish archæologists.* Prof. Nilsson has minutely described these implements, and tried to prove they had been used in chipping weapons and tools of flint.

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*Drawings of European hammerstones resembling those of the Indians are found in the following works — Nilsson: The Primitive Inhabitants of Scandinavia (London 1868), Pl. I, Fig. 1; Worsaae: Nordiske Oldsager etc. (Copenhagen 1859), Figs. 32, 33; Stevens: Flint Chips (London 1870), Fig. 122; Evans: The Ancient Stone Implements, etc. of Great Britain (London 1872), Figs. 161, 164.

It is not my intention to enter here into a discussion concerning the views of the meritorious Swedish archæologist: I will merely state my opinion in regard to the probable use of the hammerstones from the Susquehanna valley. That these latter were employed as hammers cannot be doubted, since they show the most distinct traces of violent contact with hard substances; yet, according to my view, it was almost impossible to employ them *immediately* in fashioning flint implements. They are by far too clumsy, and possess too much roundness on all sides to have been the tools for fabricating arrowheads and other delicate articles of flint.* Not even the rude notches in the netsinkers could have been produced by their immediate application. Nevertheless, they may have served, besides fulfilling other purposes, as *coöperating* tools in the manufacture of flint implements. Mr. Catlin has described the method employed by the Apaches and other western tribes in making flint points for arrows and spears. The work, he states, is performed by two persons, one of whom holds the piece of flint to be operated upon in the left hand and places with the right hand a chisel or punch (made of a tooth of the sperm-whale) against the protuberances of the flint, which are to be removed, while his assistant strikes the chisel on the upper end with a mallet of hard wood and thus flakes off the projecting points. This process is continued until the article has acquired the desired shape.† A similar method, perhaps, was in use among certain Indians inhabiting the eastern parts of North America, and in this case the hammerstones may have replaced the wooden mallets mentioned by Catlin.

Yet while I doubt the immediate application of these heavy hammerstones in the manufacture of flint points, I do not deem it altogether improbable that they were directly used as hammers for chipping certain rude implements of graywacke, or a kind of tough slate, which occur in great abundance in the neighborhood of Muncy. These implements are of various shapes, mostly wedge-like in form, and are sometimes quite large. Many of them have distinct scraper-edges, and probably were used in the preparation of hides and for other kindred purposes. I further believe that there is a certain connection between the netsinkers and hammerstones of Muncy, in so far as the latter served in the manufacture of the former. Two workmen, I imagine, were active in the operation. One held the pebble, its narrow side upward, firmly in the hand; the other placed a piece of flint of suitable shape and strength at the spot where the notch was to be cut out, and gave the flint wedge a heavy blow with the hammerstone, thus effecting the indentation. In this manner a great many sinkers could be made in a short time.

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*Among my specimens from Muncy there is a hammerstone of flint, which may have been used directly in making arrowheads. It is a nearly round, somewhat flat stone, two inches and three-eighths in diameter, and weighing six ounces and a quarter. The edge or rather circumference is much battered by continued use. Similar flint hammerstones found in England, are figured on page 223 of Mr. Evans' new work, "The Ancient Stone Implements, Weapons, and Ornaments of Great Britain."

†Catlin: Last Rambles amongst the Indians, New York, 1867, p. 187.

From the great number of netsinkers found near Muncy, it may be deduced that the Indians were much engaged in fishing at this point. Indeed, the Susquehanna is here about nine hundred and fifty feet wide, very deep in some places, and well stocked with fish, among which I will mention perch, pike, sunfish, catfish, and eels. There existed formerly a shad-fishery near Muncy, before the river was obstructed by dams. Salmon is still sometimes caught. Formerly, however, fish were still more abundant, and the locality, therefore, afforded the aborigines great advantages as a fishing-station. When the first white settlers penetrated to this region, they found on or near the present site of Muncy a village of the Minsi or Munsey Indians, the Wolf tribe of the great Leni-Lenape or Delaware nation. The name "Muncy," indeed, perpetuates the tribal designation of those aboriginal predecessors, whose scanty descendants now dwell, far from the home of their fathers, in the districts beyond the Mississippi. The Minsi Indians, I think, may be considered as the manufacturers of the stone implements described in these pages.

Netsinkers of stone are even in our time in use among certain tribes of the northwest coast of North America; as for instance, among the Chinooks (at the mouth of the Columbia river), who attach them to their salmon-nets. "Their nets," says Mr. Swan, "are made of a twine spun by themselves from the fibres of spruce roots prepared for the purpose, or from a species of grass brought from the north by the Indians. It is very strong, and answers the purpose admirably. Peculiar-shaped sticks of dry cedar are used for floats, and the weights at the bottom are round beach pebbles, about a pound each, notched to keep them from slipping from their fastenings, and securely held by withes of cedar firmly twisted and woven into the foot-rope of the net. The nets vary in size from a hundred feet long to a hundred fathoms, or six hundred feet, and from seven to sixteen feet deep." *

Fishing-nets may be counted among the utensils invented at very early periods, on the spur of necessity, by men in various parts of the world. That they were already in use in Europe at a remote time of antiquity is proved by their remnants preserved in an almost marvellous manner in the Swiss pile-constructions of the stone age, as, for instance, those of Robenhausen and Wangen. In the earliest works on North America the fishing-nets of the Indians are mentioned, but not described. Cabeça de Vaca, the first European who gave an account of the interior of North America, refers in various places, though in a transient manner, to the nets of the natives whom he met during his long wanderings.† Garcilasso de la Vega and the anonymous Portuguese gentleman, called the Knight of Elvas, the two principal authors who have left accounts of De Soto's expedition (1539–43) are likewise deficient in all such details as might serve to illustrate the original character of Indian nets. The latter relates, however, that the Spaniards, while at a place near the Mississippi, called Pacaha (Garcilasso has it "Capaha"), caught fish in a lake with nets furnished by the Indians.‡ This establishes at least the fact that the tribes of the Mississippi valley employed fishing-nets, when first seen by Europeans. The Indians of the present New England States made strong nets of hemp. For this we have the authority of Roger Williams, who gives also the word *ashóp*, which signifies a net in the language of the Narragansetts.§ Yet it appears that the Indians of the Atlantic Coast (and others) practised more the "spearing" of fish than their capture in nets. Some were also killed by arrow-shots.‖ According to Van der Donck,¶

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* Swan: The Northwest Coast, New York, 1857, p. 104.

† Relation et Naufrages d'Alvar Nuñez Cabeça de Vaca (Ternaux-Compans), Paris, 1837, pp. 24, 142, 177, 179. Original printed at Valladolid in 1555.

‡ Narratives of the Career of Hernando de Soto, etc., translated by Buckingham Smith, New York, 1866, p. 112.

§ Roger Williams: A Key into the Language of America, London, 1643; Providence, R. I., 1827, p. 102.

‖ The practice likewise prevailed of erecting in the water large labyrinth-like enclosures of lattice-work, flanked by long weirs, the whole forming a sort of gigantic trap, into which the fish were driven. Such a contrivance of the Virginia Indians is figured and described in the first volume of De Bry's "Peregrinationes" (Frankfort on the Main, 1590).

¶ Beschryvinge van Nieuw-Nederlandt, Amsterdam, 1656, p. 70.

the Indians in the neighborhood of New Amsterdam (now New York) employed, during the middle of the seventeenth century, various kinds of nets; but this author does not state whether these nets were original Indian inventions, or adopted from the Dutch colonists. The Natchez, on the Lower Mississippi, made their nets from the bark of the linden tree, and knitted them quite in the European fashion.*

Reverting, in conclusion, once more to netsinkers, I will mention that in the United States there also occur some provided with a perforation, instead of being notched. I had occasion to examine in the collection of Col. Charles C. Jones, of Brooklyn, a number of the perforated kind, which the owner had found in Eastern Georgia, at the confluence of the Great Kiokee Creek with the Savannah river, a spot where Indian relics abound. The material of these sinkers is the talcose stone commonly called soapstone. They consist of flat smoothed pieces, of indefinite but mostly rounded outline, which are an inch or less in thickness, and measure from three to six inches in diameter. The holes are usually drilled from two sides, and therefore narrowing in the middle, where they are about half an inch wide. Col. Jones will figure and describe these Indian implements in his forthcoming work on the antiquities of the State of Georgia.

THE FOSSIL MAMMALS OF THE ORDER DINOCERATA.†—*With Two Plates.*

BY PROFESSOR O. C. MARSH.

AMONG the many extinct animals of interest hitherto discovered in the Tertiary of the Rocky Mountain region, none, perhaps, are more remarkable than the huge mammals which have recently been described from the Eocene beds of Wyoming. It is important, therefore, that accurate information in regard to them should be promptly made public, especially as serious errors on this subject have already appeared in various scientific publications, and are being widely disseminated.

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*Du Pratz: Histoire de la Louisiane, Paris, 1758, Vol. II, p. 179.

†Published in part in the "American Journal of Science," Vol. V, p. 117, Feb., 1873.